IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	Confirmation No. 1174
Raffi Codilian	Art Unit: 2841
Serial No.: 10/724,299	Examiner: Yuriy Semenenko
Filed: November 26, 2003	Docket No. A1398
For: **DISK DRIVE PRINTED CIRCUIT BOARD WITH COMPONENT-DEDICATED ALIGNMENT LINE INDICATORS INCLUDING INNER AND OUTER LINE SEGMENTS**	

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF UNDER 37 CFR § 41.37

I. Real Party in Interest

Western Digital Technologies, Inc.
20511 Lake Forest Drive, E-118G
Lake Forest, CA 92630
USA

II. Related Appeals and Interferences

No other appeals or interferences are currently known to Appellant that will directly affect, be directly affected by, or have a bearing on the decision to be rendered by the Board of Patent Appeals and Interferences in the present appeal.

III. Status of Claims

Claims 1-6 and 16-20 are pending in the application, with claims 7-15 being cancelled. No claims have been allowed.

The rejection of claims 1-6 and 16-20 is the subject of this appeal.

IV. Status of Amendments

No claim amendments were filed subsequent to the final rejection mailed July 12, 2007. All previously-filed claim amendments have been entered.

Claims 1-6 and 16-20 are provided in the attached Claims Appendix.

V. Summary of Claimed Subject Matter

Claims 1 and 16 are independent claims that are being appealed.

Claim 1 is directed to a disk drive printed circuit board for better defining a perimeter on its mounting surface to facilitate proper positioning and alignment when mounting a disk drive electrical component. For example, Figure 1 illustrates a printed circuit board assembly 14 including a board 26 with a mounting surface 30 upon which an electrical component 32 is mounted. The component 32 "defines a rectangular perimeter 34" as is discussed in paragraph [0028] and shown in Figure 3 of Appellant's specification.

Specifically, claim 1 calls for a "board body" and a "mounting surface disposed upon the board body" such as the board 26 and the surface 30 shown in Figure 1 and described in paragraph [0029] of Appellant's specification. Claim 1 further calls for "component-dedicated alignment line indicators visibly disposed on the mounting surface for visibly aligning the disk drive electrical component on the mounting surface." Generally, the use of such alignment line indicators is shown in Figures 4-11 and is described in paragraphs [0029] to [0031]. Claim 1 calls for these alignment line indicators to include "first and second inner line segments" that are spaced apart less than the diagonal distance defined by the perimeter as well as "third and fourth inner line segments" that are also spaced apart less than the diagonal distance. Exemplary inner line segments as called for in claim 1 can be seen in Figure 4 with lines 54, 56, 58, and 60 with the diagonal distance shown as "D" in Figure 3. Paragraph [0029] explains the positioning of these inner line segments and their sizing relative to the perimeter shown in Figure 3 and defined (e.g., "component-dedicated") by the electrical component 32. Claim 1 further calls for "first and second outer line segments disposed parallel to the first and second inner line segments" and "spaced apart a first outer spacing more" than the spacing of the first and second inner line

segments and less than the diagonal distance. Examples of such outer line segments are shown with lines 62 and 64 in Figure 4 that are spaced apart from and parallel to the inner line segments 54 and 56. These outer line segments are described in paragraph [0029].

The "component-dedicated alignment line indicators" of claim 1 are particularly suited for signifying proper installation of a component 32 (such as a sensor or the like) "both in terms of translational positioning and rotational positioning" as noted in paragraph [0036] of Appellant's specification. The examples shown in Figures 6-11 and described in paragraphs [0037] to [0044] explain some of the uses of the board 26 with its component-dedicated alignment line indicators disposed on its mounting surface 30. These paragraphs of Appellant's specification also detail some of its advantages over prior devices including allowing "for a higher degree of differentiation between translational and rotational positioning errors" (see, paragraph [0040], lines 12-18, for example).

Independent claim 16 is directed to a hard drive circuit board such as but not limited to board 26 of Figure 1 that is useful for mounting a disk drive electrical component such as component 32 with a rectangular mounting base. Claim 16 calls for a "rigid board body" such as the board body 28 of Figure 1, and a "mounting surface" such as surface 30 of Figure 1 is provided on the body. Claim 16 is similar to claim 1 in that it calls for "a first pair and a second pair of spaced apart, parallel inner line segments" such as lines 54, 56, 58, and 60 of Figures 4, 12, and 13. These lines "define a rectangle having a width and a length at least as large as a width and a length of the base of the electrical component" as is described in paragraphs [0028] and [0029] such that the inner line segments are component specific or are sized and shaped based on the electrical component. Claim 16 further calls for "a pair of outer line segments disposed parallel to and spaced apart from the first pair of the inner line segments" with the first pair of the inner line segments positioned between the outer line segments. With reference to Appellant's Figure 13, these outer lines may be the pair of lines 62 and 64 or the pair of lines 66 and 68. As with claim 1, each of these line segments is "disposed upon the mounting surface" and is not merely part of the electrical component. As explained in paragraph [0031], the line segments or indicators may be "silk screened upon the mounting surface 30 of the printed circuit board 26" or otherwise disposed "upon" the mounting surface 30.

VI. Grounds of Rejection to be Reviewed on Appeal

Claims 1-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. Appl. No. 2002/0050397 ("Sakamoto") in view of U.S. Pat. No. 5,065,092 ("Sigler").

Claims 16-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sakamoto in view of U.S. Pat. No 6,798,609 ("Bonin").

VII. Argument

Rejection of Claims 1-6 is Improper Under 35 U.S.C. §103 Based on Sakamoto and Sigler

In the final Office Action of July 12, 2007, claims 1-6 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. Appl. Publ. No. 2002/0050397 ("Sakamoto") in view of U.S. Pat. No. 5,065,092 ("Sigler"). This rejection is traversed based on the following remarks, and Appellant requests that the rejection be reversed as not properly supported.

As an initial matter, Appellant notes that Sakamoto does not teach or discuss alignment of electrical components on a printed circuit board. Instead, Sakamoto discusses a method for better controlling the temperature of a semiconductor module on a flexible sheet of a disk drive. This is a very different problem than addressed by Appellant, and Sakamoto does not discuss accurate aligning but instead teaches enhanced heat dissipation. To this end, Sakamoto shows in Figures 1A, 1B, 2A, 2B, and 2C a flexible sheet 11 made up of two insulating sheets P1 and P2 between which pad electrodes PD are sandwiched. A first opening OP is cut in the sheet P2 to expose the pads PD and a hole 13 is cut through both sheets P1 and P2. A semiconductor module 10 is mounted on the flexible sheet 11 with a portion contacting the pads PD and a portion extending through the hole 13 to mate with a radiation substrate 13A.

This background is significant because Appellant argues below that Sakamoto fails to provide any visible line indicators on its mounting surface and its physical structures. Even if these were considered to be alignment aids as argued by the Examiner, they would not be useful for accurately aligning the module 10 as it is placed on the flexible sheet 11 (e.g., the edges of the opening cited by the Examiner as teaching the claimed line segments that are at least as large as the perimeter of the component being mounted the board body is smaller than the module 10

and are hidden during installation as shown in Fig. 2A where the insulating resin layer 25 of module 10 completely hides the "lines" or edges cited by the Examiner in his Fig. 1*, which is a version of Sakamoto's Fig. 2A in which hidden features have been made solid).

In claim 1, the component-dedicated alignment line indicators are "visibly disposed on the mounting surface for visibly aligning the disk drive electrical component on the mounting surface." This claim limitation requires that the line indicators are "on the mounting surface" and are useful for visibly aligning a component on that same surface. Hence, indicators or line segments that are not on the mounting surface of a circuit board fail to teach or suggest such indicators. The claim further calls for first to fourth inner line segments and then also for first and second outer line segments outside a pair of the inner segments. All of these segments must be disposed "on the mounting surface" according to the language of claim 1, with an example implementation shown in Figure 4 of Applicant's specification.

Turning specifically to the rejections provided in the final Office Action, claim 1 calls for the "component-dedicated alignment line indicators" to include four inner line segments that are disposed on the mounting surface of the board body. Sakamoto is cited for showing these 4 line segments on the surface 11 with the edges of the "hole" or heat passageway 13 in sheet P1. Appellant asserts (and has asserted in prior Amendments when the Examiner had been citing recessed surface OP as showing the outer line segments) that edges of a hole or recessed surface are not visibly disposed line indicators on a surface as called for in the claims (i.e., Appellant asserts that there are no line segments shown as being disposed on either side or surface of sheet 11 of Sakamoto as can be seen by examining Fig. 1A or Fig. 2A of Sakamoto).

Further, claim 1 calls for the inner line segments to be spaced apart such that opposing pairs are spaced apart at least as much as the first and second lateral distances of the perimeter, which is defined by the electrical component. Hence, the inner line segments of claim 1 define a rectangular shape that is at least as large as the perimeter of the disk drive electrical component (e.g., so as to facilitate visible alignment of a part). As a result, it is not adequate for Sakamoto to teach a set of inner line segments, but these segments also have to be arranged with the spacing and/or dimensions that allow a component of a particular perimeter to be placed within

these lines. Sakamoto does not show such a set of inner line segments and does not support a rejection of claim 1.

In prior Office Actions, the Examiner asserted that module 10 in Sakamoto defines the perimeter called for in claim 1 with the outer boundaries of layer 25 and then stated that edges of a hole 13 provide the inner line segments. The Appellant made arguments that it was clear from Figure 1A that the hole 13 is much smaller than item 10, i.e., the perimeter of the hole 13 is much smaller than the perimeter of the base of item 10 defined by layer 25. Hence, even if Examiner were correct that edges of a recessed surface or hole can be construed as showing lines disposed on a surface (which Applicant does not accept), the hole must meet all the requirements or limitations for the line segments of claim 1 including that they be spaced apart by the distances specified (at least the first and second lateral distances). Appellant further argued that the Examiner has misunderstood the first and second lateral distances requirement of claim 1 because in the Examiner-provided Fig. 1* the first and second lateral distances are shown to be quite a bit smaller than would be the case if the component 10 were used to define the perimeter. Specifically, in the prior Fig. 1*, the lateral distances were shown by the Examiner to be within hole 13 or within the portion of Sakamoto's device cited for teaching the inner line segments when by the language of claim 1 this cannot be the case because claim 1 states, for example, "at least the first lateral distance" when describing the first inner spacing between the first and second inner line segments.

In the final Office Action of July 12, 2007, the Examiner has revised Fig. 1* to show differing first and second lateral distances that fall within the dimensions of the hole 13. These dimensions are intended to match the perimeter of the newly-cited component 16 rather than the base layer 25 of module 10. While the component 16 appears to have a perimeter that is smaller than the dimensions of the hole 13, Appellant believes the outer perimeter of the layer 25 is the portion for which the lateral distances between the inner line segments would be relevant. This is because Sakamoto teaches that the module 10 is mounted upon the sheet 11 by provides no teaching about mounting the component 16 upon the layer 25 or a need for alignment thereupon. Hence, if alignment were an issue, the mounting of the base 25 upon the sheet P2 would have to be performed with high accuracy as well as the accurate mounting of component 16 upon base

25. Appellant argues that the rejection cites component 16 because it is smaller than hole 13 rather than for any reason having to do with a need for aligning the component 16 (or layer 25) upon the flexible sheet 11, and Appellant requests that the rejection of claim 1 be reversed for this additional reason.

Yet further, even if the Examiner's assertion is utilized (i.e., that the component 16 provides the rectangular perimeter of claim 1 and the hole 13 shows the inner line segments with its edge), Sakamoto still fails to show the component-dedicated alignment indicators of claim 1 because these indicators are disposed "for visibly aligning the disk drive electrical component on the mounting surface." Using common sense, the hole 13 simply cannot be used to visibly align component 16. The Examiner's Fig. 1* fails to show the inner line segments cited in Sakamoto as hidden lines. In other words, the base 25 of module 10 is much larger than the hole 13, and when the module 10 is positioned over the hole 13 in sheet P2, there is no way that the hole 13 can be seen. Hence, during assembly of the Sakamoto device, the hole 13 is hidden by item 10 as soon as item 10 is placed on or near the surface of sheet 11. The term "visibly aligning" was selected by Appellant specifically to clarify that claim 1 is directed to a board that facilitates accurate aligning by providing an assembler visual cues that enable them to place the disk drive electrical component within a set of inner line segments with a perimeter similar to the component but at least as large, e.g., as shown in Appellant's Fig. 5 where the component 32 is placed within the inner segments 54-60 and the segments 54-60 are still visible. The hole 13 of Sakamoto functions to dissipate heat but has no value for visibly aligning the base 25 or the component 16 mounted on the base 25. For this additional reason, claim 1 is not taught or suggested by Sakamoto.

In addition to the four inner line segments, claim 1 calls for the component-dedicated alignment line indicators "disposed on the mounting surface" to include first and second outer line segments disposed parallel to the first and second inner line segment but spaced apart a "first outer spacing more than the first inner spacing." For example, these outer segments may take the form of segments 62, 65 shown in Fig. 4 of Appellant's specification. This language of claim 1 requires that the outer line segments be disposed "on the mounting surface" along with the four inner line segments. Sakamoto fails to show a single mounting surface that includes six line

segments as called for in claim 1. At page 5, the Office Action cites the edges of the first opening OP in the second insulating sheet P2 as teaching the outer line segments of claim 1. As discussed below in detail, Appellant disagrees that edges of a hole teach "line indicators disposed on the mounting surface for visibly aligning" a component. However, even if the edge of OP were found to teach line indicators disposed on a surface, the edges of OP are on surface of sheet P2, which is the mounting surface of flexible sheet 11 for the module 10, while the edges of hole 13 are on the surface of sheet P1. Hence, even if the Examiner's argument regarding the edges versus disposed indicator argument is conceded, Sakamoto fails to teach the component-dedicated alignment line indicators of claim 1 because the 6 line segments (inner and outer line segments) are not all disposed upon a single surface that is also the mounting surface for the board. For this additional reason, Appellant requests that the rejection of claim 1 based on Sakamoto be reversed.

Claim 1 calls for "component-dedicated alignment indicators" disposed on the mounting surface of a circuit board body. Sakamoto fails to teach any "indicators visibly disposed on the mounting surface" as called for in claim 1. The Office Action cites Sakamoto in Fig. 1 and its "circuit board 11" as showing these indicators for use with component 10. However, as seen in Figures 1A, 1B and 2A, Sakamoto teaches a flexible sheet 11 that includes no visible indicators on its surface for aligning component 10. Instead, Sakamoto teaches that an opening OP is cut through its insulating sheet P2 and another opening 13 is cut through another insulating sheet P1. As can be seen clearly in Figure 1A, there are no visible alignment line indicators provided on flexible sheet 11. For this additional reason, claim 1 is believed allowable over Sakamoto.

On page 3 of the Office Action, the Examiner states "any edges can be consider [sic] as a visual reference or 'line indicators'" to support the use of the edges of Sakamoto as teaching the line indicators of claim 1. However, the Examiner fails to explain how an "edge" is disposed on a surface as called for by the line indicators, which seems to read this claim limitation out of the claim (or to give it no patentable weight). Appellant argues that a person skilled in the art would not construe "line indicators disposed on the mounting surface for visibly aligning" a component so broadly as to encompass edges of a board, and Appellant's specification does not conflict with this ordinary meaning for these claim terms. For example, all the examples shown in

Appellant's figures regarding line indicators include line segments that are provided on the board surface 30 and an edge of the board 28 is never mentioned as being useful as one or more of the alignment line indicators. Appellant argues that an edge is not "on" a surface but is instead the outer boundary that defines the surface, and this ordinary meaning for "edge" should be adopted to find that Sakamoto's holes or edges fail to show alignment line indicators disposed on the surfaces of sheets P1 and P2. Because Sakamoto fails to show line indicators disposed on a mounting surface, this reference fails to teach or suggest the circuit board of claim 1, and the rejection should be reversed.

Sigler fails to overcome the above-discussed deficiencies of Sakamoto. The Office Action on page 3 cites Sigler at col. 7, lines 46-50 for teaching that the use of line indicators as visual references in an alignment process were well known at the time Appellant's application was filed. Appellant agrees that visual line indicators were known, but the prior line indicators failed to show the use of a set of inner line segments in combination with a pair of outer line segments as called for in claim 1. For example, Appellant's note in para. [0040] towards the bottom of page 13 that claimed arrangement is advantageous over prior art configurations that only showed inner line segments because such configurations fail to provide "differentiation between translational and rotational positioning errors" as is achieved with the use of outer line segments with the inner line segments. At the citation, Sigler teaches the scribing of a window on a film to provide a visual reference when an operator looks through a microscope. This teaching does not address the deficiencies of Sakamoto (e.g., fails to suggest line indicators disposed on a mounting surface, line indicators on a mounting surface that include four inner line segments related to a component perimeter along with two outer line segments, and the like). Hence, the combination of Sakamoto and Sigler does not teach or suggest the circuit board of claim 1.

Claims 2-6 depend from claim 1 and are believed allowable over Sakamoto and Sigler at least for the reasons provided for allowing claim 1. Further, claim 3 calls for the line indicators to include a third outer line segment. The Office Action indicates that this third line segment is shown by another physical edge of the OP in the sheet P2. As discussed above, an edge of hole or opening does not teach disposing a line segment on an upper side of the sheet. Additionally,

the edge of the OP and the edges of the hole 13 cannot be said to be both disposed upon a single mounting surface as required of the third outer line segment, the first and second outer line segments, and the inner line segments. For these additional reasons, claim 3 is not shown by Sakamoto or Sigler. Claim 5 is believed allowable for a similar reason as claim 3 because it calls for third and fourth outer line segments (such as, but not limited to, the embodiment shown by Appellant's Figure 5).

Rejection of Claims 16-20 Under 35 U.S.C. §103 is Improper Based on Sakamoto In View of Bonin

The final Office Action rejected claims 16-20 under 35 U.S.C. §103(a) as being unpatentable over Sakamoto in view of Bonin. Appellant requests that this rejection be reversed based on the following remarks.

Independent claim 16 includes limitations similar to claim 1, and the reasons provided above for allowing claim 1 over Sakamoto are believed equally applicable to claim 16. Bonin fails to overcome the deficiencies of Sakamoto discussed with reference to claim 1. Bonin is cited at the bottom of page 8 of the Office Action as teaching a board body that is rigid as called for in claim 16. However, Bonin is not cited by the Examiner as providing any of the teaching missing in Sakamoto, and, upon review, Bonin fails to show the inner line segments or the outer line segments of claim 16. As a result, the combination of Sakamoto and Bonin fails to teach or suggest the hard drive circuit board of claim 16, and Appellant requests that the rejection of this claim be reversed.

Claims 17-20 depend from claim 16 and are believed allowable over Sakamoto and Bonin at least for the reasons provided for allowing claim 16. Additionally, claim 17 includes limitations similar to claim 5, and, as a result, the reasons provided for allowing claim 5 over Sakamoto are applicable to claim 17.

Claim 19 specifically calls for the line segments to be applied using silk screening. The Examiner argues in the final Office Action that this is a mere process limitation in a product claim and asserts that it is only a limitation to the degree that it defines the product itself.

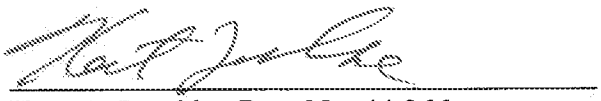
However, the Examiner did not appear to give this limitation any patentable weight. Appellant asserts that this limitation clarifies or further supports the claim construction that the indicator lines actually are on the mounting surface and not simply an edge or part of a later mounted component or a hole in a board as are the components of the references being cited by the Examiner. The Examiner has yet to cite a reference that shows line segments being applied to a mounting surface by any technique, let alone by silk screening. For these additional reasons, claims 17 and 19 are believed allowable over the combined teaching of Sakamoto and Bonin.

Conclusion

In view of the above remarks, the pending claims are believed allowable and the case in condition for allowance. Appellant respectfully requests that the rejections of all pending claims be reversed.

Respectfully submitted,

Date: 11/12/07



Kent A. Lembke, Reg. No. 44,866
MARSH FISCHMANN & BREYFOGLE LLP

VIII. CLAIMS APPENDIX

1. A disk drive printed circuit board for use with a disk drive electrical component, the disk drive electrical component defining a rectangular perimeter, the perimeter including opposing first and second edges spaced apart a first lateral distance, the perimeter further including opposing third and fourth edges extending between the first and second edges and spaced apart a second lateral distance, the perimeter further including opposing corners spaced apart a diagonal distance, the printed circuit board comprising:

a board body;

a mounting surface disposed upon the board body; and

component-dedicated alignment line indicators disposed on the mounting surface for visibly aligning the disk drive electrical component on the mounting surface, the component-dedicated alignment line indicators including:

first and second inner line segments spaced apart a first inner spacing at least the first lateral distance and less than the diagonal distance;

third and fourth inner line segments extending between and perpendicular to the first and second inner line segments, the third and fourth inner line segments spaced apart a second inner spacing at least the second lateral distance and less than the diagonal distance; and

first and second outer line segments disposed parallel to the first and second inner line segments with the first and second inner line segments between the first and second outer line segments, the first and second outer line segments spaced apart a first outer spacing more than the first inner spacing and less than the diagonal distance.

2. The printed circuit board of Claim 1 wherein the third and fourth inner line segments intersect the first and second inner line segments.

3. The printed circuit board of Claim 1 wherein the component-dedicated alignment line indicators further includes a third outer line segment extending between

and perpendicular to the first and second outer line segments, the third outer line segment is disposed with the third inner line segment between the third edge of the disk drive component and the third outer line segment.

4. The printed circuit board of Claim 3 wherein the third outer line segment intersects the first and second outer line segments.

5. The printed circuit board of Claim 1 wherein the component-dedicated alignment line indicators further includes third and fourth outer line segments extending between and perpendicular to the first and second outer line segments, the third and fourth inner line segments spaced apart a second outer spacing at least the second lateral distance and less than the diagonal distance.

6. The printed circuit board of Claim 5 wherein the third and fourth outer line segments intersect the first and second outer line segments.

16. A hard drive circuit board for use with a disk drive electrical component with a rectangular mounting base, comprising:

a rigid board body;

a mounting surface on the board body;

a first pair and a second pair of spaced apart, parallel inner line segments disposed upon the mounting surface, wherein the four inner line segments define a rectangle having a width and a length at least as large as a width and a length of the base of the electrical component; and

a pair of outer line segments disposed parallel to and spaced apart from the first pair of the inner line segments with the first pair of the inner line segments being positioned between the pair of outer line segments.

17. The circuit board of claim 16, further comprising an additional pair of outer line segments disposed parallel to and spaced apart from the second pair of the inner line segments, with the second pair of the inner line segments being positioned between the additional pair of outer line segments.

18. The circuit board of claim 17, wherein the inner line segments and the outer line segments are visibly disposed on the mounting surface.

19. The circuit board of claim 18, wherein the inner line segments and the outer line segments are applied to the mounting surface using silk screening.

20. The circuit board of claim 16, wherein the rectangle formed by the four inner line segments is sized to circumscribe the base of the electrical component when the electrical component is centered within the four inner line segments on the mounting surface.

IX. EVIDENCE APPENDIX

No copies of evidence are required with this Appeal Brief. Appellant has not relied upon any evidence submitted under 37 C.F.R. §§ 1.130, 1.131, or 1.132.

X. RELATED PROCEEDINGS APPENDIX

There are no copies of decisions rendered by a court or the Board to provide with this Appeal as there are no related proceedings.